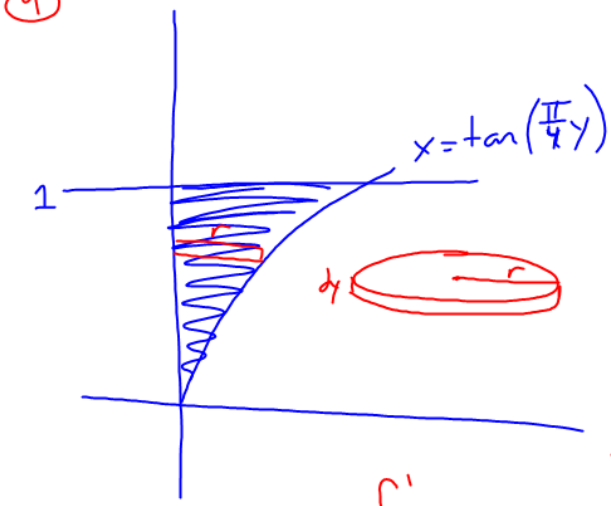
(9)




- $r = x = \tan\left(\frac{\pi}{4}y\right)$
- $A_{disc} = \pi r^2$

$A_{disc} = \pi\left(\tan\left(\frac{\pi}{4}y\right)\right)^2$

- $V_{disc} = \pi \tan^2\left(\frac{\pi}{4}y\right) dy$

$$\pi \int_0^1 \tan^2\left(\frac{\pi}{4}y\right) dy$$

$$\pi \int_0^1 \left(\sec^2\left(\frac{\pi}{4}y\right) - 1\right) dy$$

$u = \frac{\pi}{4}y$

$du = \frac{\pi}{4} dy$

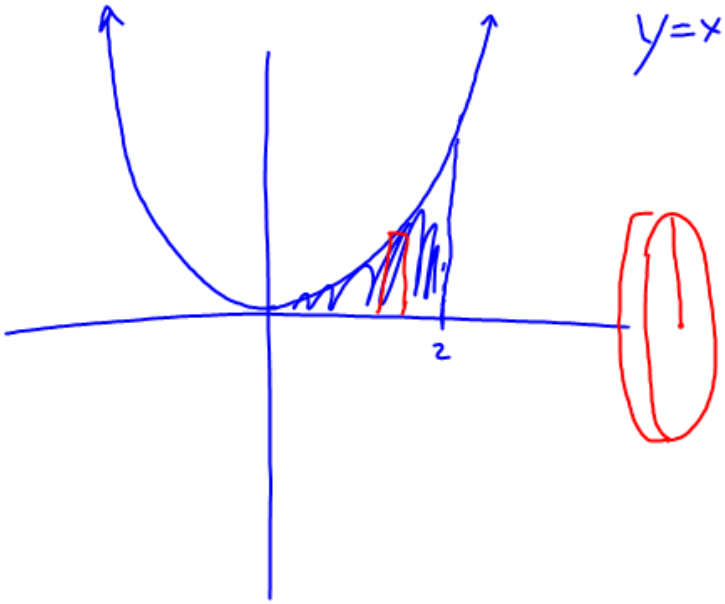
$dy = \frac{4}{\pi} du$

$$\pi \left[\frac{4}{\pi}\tan\left(\frac{\pi}{4}y\right) - y\right]_0^1$$

$$4\tan\left(\frac{\pi}{4}\right) - \pi$$

$$\boxed{4 - \pi}$$

11




$y = x^2$ $x = 0$ $x = 2$
$y = 0$

- $r = y = x^2$
- $A_{disc} = \pi y^2$

$A_{disc} = \pi (x^2)^2$

$= \pi x^4$

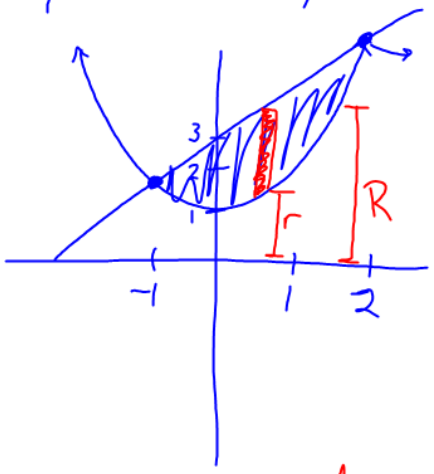
- $Volume = \pi x^4 dx$

$$\pi \int_0^2 x^4 dx \longrightarrow \pi \frac{x^5}{5} \Big|_0^2$$

$$\frac{32\pi}{5}$$

17

$y = x^2 + 1$ $\quad y = x + 3$




$x^2 + 1 = x + 3$

$x^2 - x - 2 = 0$

$(x-2)(x+1) = 0$

$x = -1, 2$

$R = x + 3$

$r = x^2 + 1$




$\pi R^2 - \pi r^2$

Area disc $\pi\left(R^2 - r^2\right)$

Volume washer $\pi\left((x+3)^2 - (x^2+1)^2\right)dx$

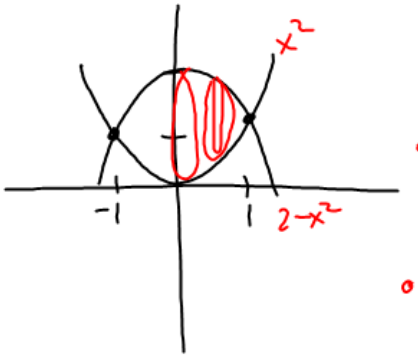
$x^2 + 6x + 9 - \left(x^4 + 2x^2 + 1\right)$

$$\pi \int_{-1}^{2} \left(-x^4 - x^2 + 6x + 8\right) dx$$

$$\pi \left[ -\frac{x^5}{5} - \frac{x^3}{3} + \frac{6x^2}{2} + 8x \right]_{-1}^{2}$$

$$\pi \left[ \left( -\frac{32}{5} - \frac{8}{3} + 12 + 16 \right) - \left( \frac{1}{5} + \frac{1}{3} + 3 - 8 \right) \right] = 23\frac{2}{5}\pi$$

(4)




$d = (2 - x^2 - x^2)$

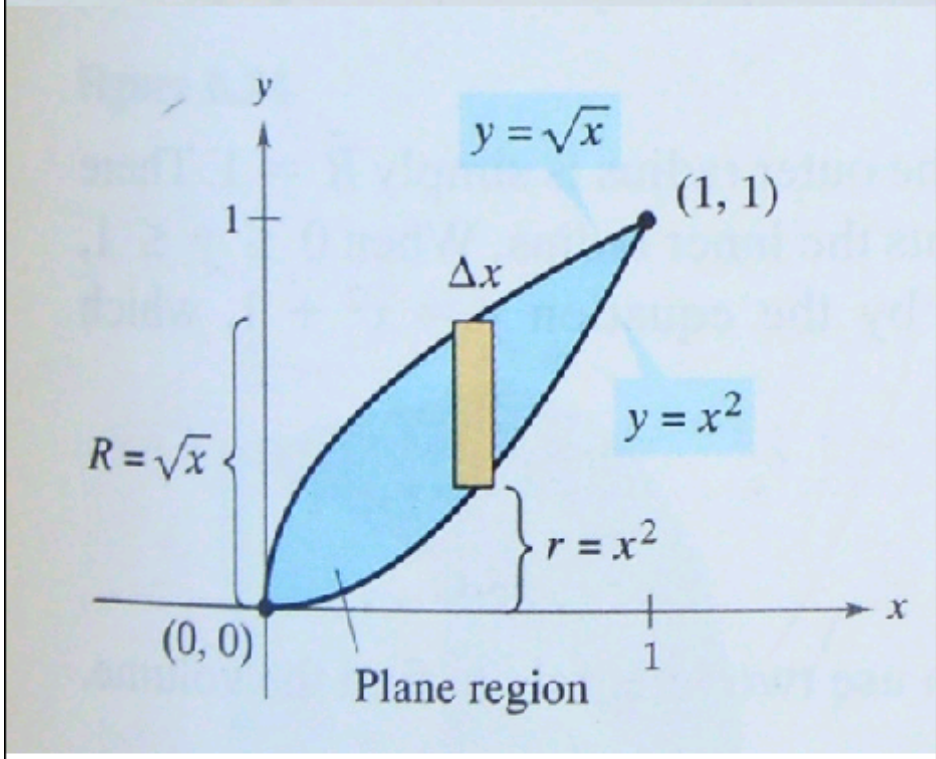
- $r = \frac{2-2x^2}{2} = 1-x^2$
- Area $\pi (1-x^2)^2$
- $V = \pi (x^4 - 2x^2 + 1)\,dx$

$$\pi \int_{-1}^{1} (x^4 - 2x^2 + 1)\,dx$$

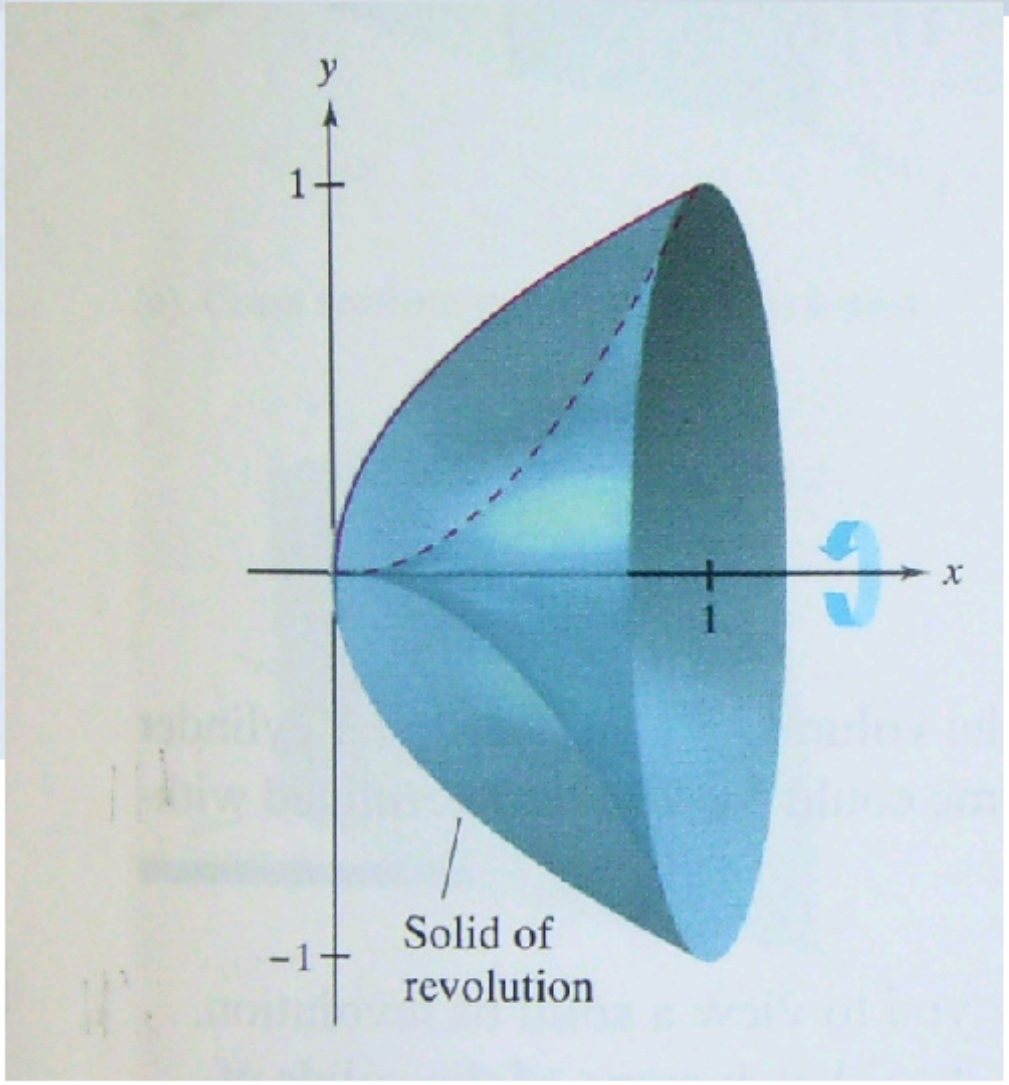
$$\pi \left[ \frac{x^5}{5} - \frac{2x^3}{3} + x \right]_{-1}^{1}$$

$$\pi \left[ \left( \frac{1}{5} - \frac{2}{3} + 1 \right) - \left( -\frac{1}{5} + \frac{2}{3} - 1 \right) \right] = \frac{16}{15}\pi$$

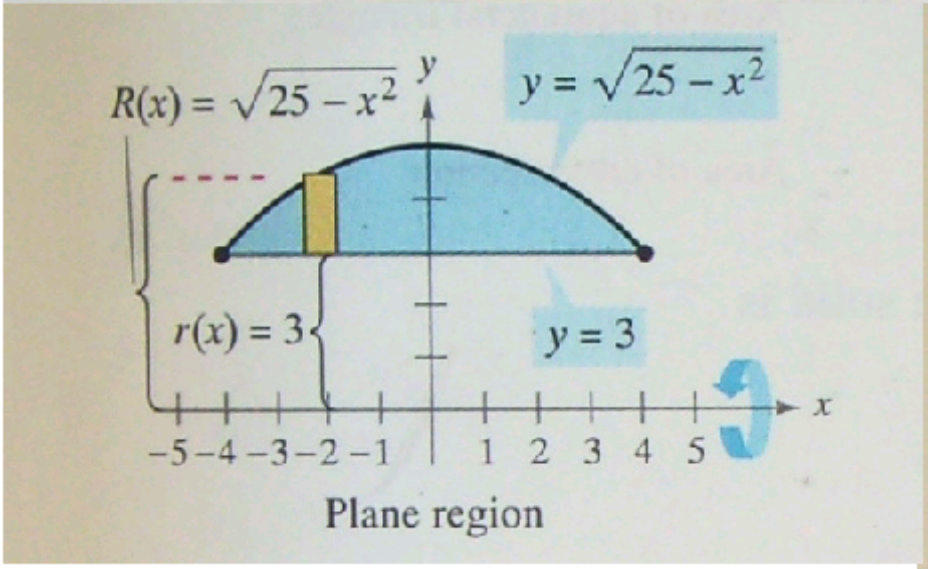
Find the volume of the solid formed by revolving the region bounded by the graphs of $y = \sqrt{x}$ and $y = x^2$ about the $x$-axis, as shown in Figure 6.21.



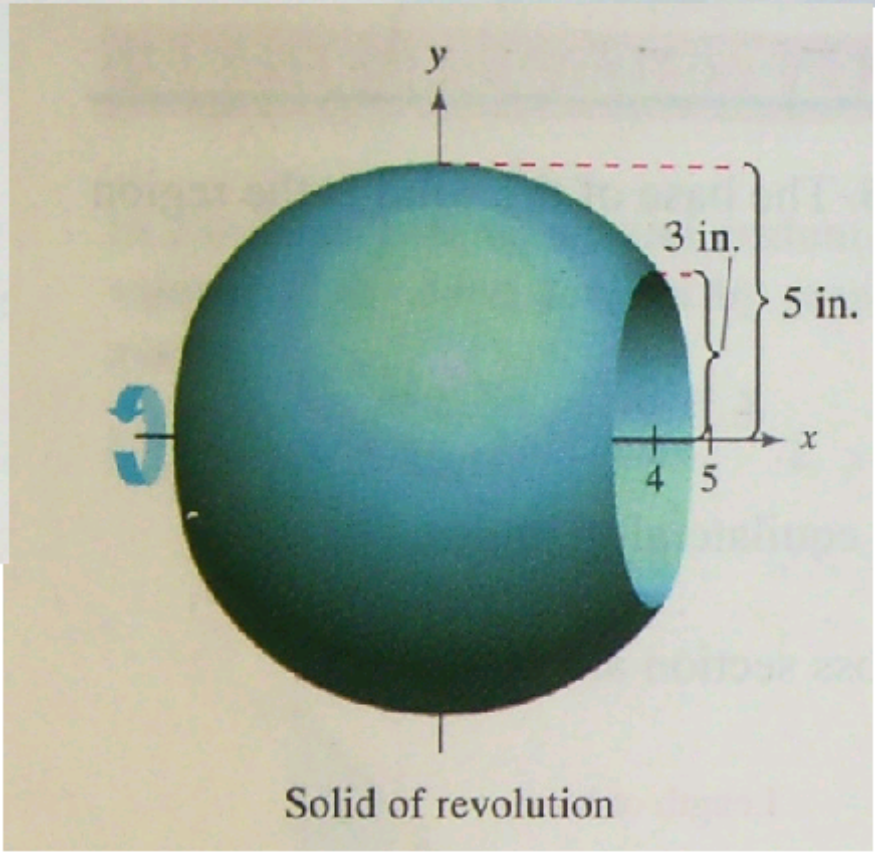

$\frac{3\pi}{10}$



A manufacturer drills a hole through the center of a metal sphere of radius 5 inches, as shown in Figure 6.24(a). The hole has a radius of 3 inches. What is the volume of the resulting metal ring?



Plane region



Solid of revolution

$\frac{256\pi}{3}$

Find the volume of the solid formed by revolving the region bounded by the graphs of $y = x^2 + 1$, $y = 0$, $x = 0$, and $x = 1$ about the $y$-axis, as shown in Figure 6.22.

HW Sect. 7.3 – what you should have done

– #7-10 (other 2) 16, 19, 20, 21, 23, 24

– Th, 3 problem

For $1 \le y \le 2$:
$R = 1$
$r = \sqrt{y - 1}$

For $0 \le y \le 1$:
$R = 1$
$r = 0$